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Kim et al.

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(54) **CABLE ADAPTOR**

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H01R 31/06 (2006.01)

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CPC ***H01R 31/06*** (2013.01); ***H01R 24/005*** (2013.01)

(58) **Field of Classification Search**
CPC H01R 31/06; H01R 24/005; H01R 13/111; H01R 13/2428; H01R 24/44; H01R 24/542
See application file for complete search history.

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(57) **ABSTRACT**

Disclosed is a cable adaptor which is connected to a cable including an outer conductor. The adaptor includes a contact pin which comes into contact with a signal pin of the cable, a first member which is conductive and disposed inside and coupled to the contact pin, a second member disposed outside and coupled to the contact pin, and a third member which is conductive and disposed outside the second member. Here, the contact pin includes a first body coupled to the second member, a first contact portion which is conductive and extends from one side of the first body to come into contact with the signal pin, and a second contact portion

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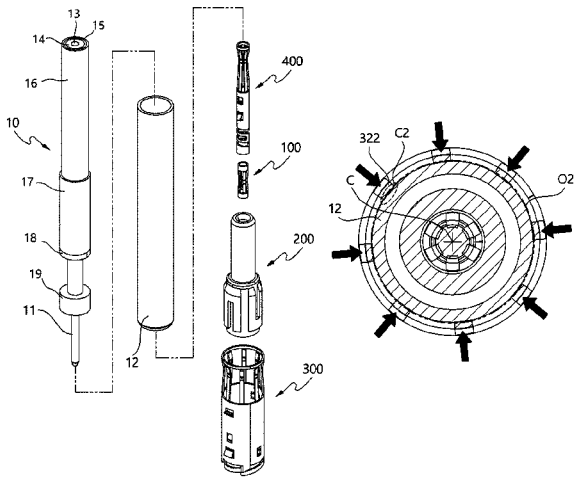

which extends from the other side of the first body and comes into contact with an object being tested. The third member includes a second body coupled to the second member and a third contact portion.

8 Claims, 17 Drawing Sheets

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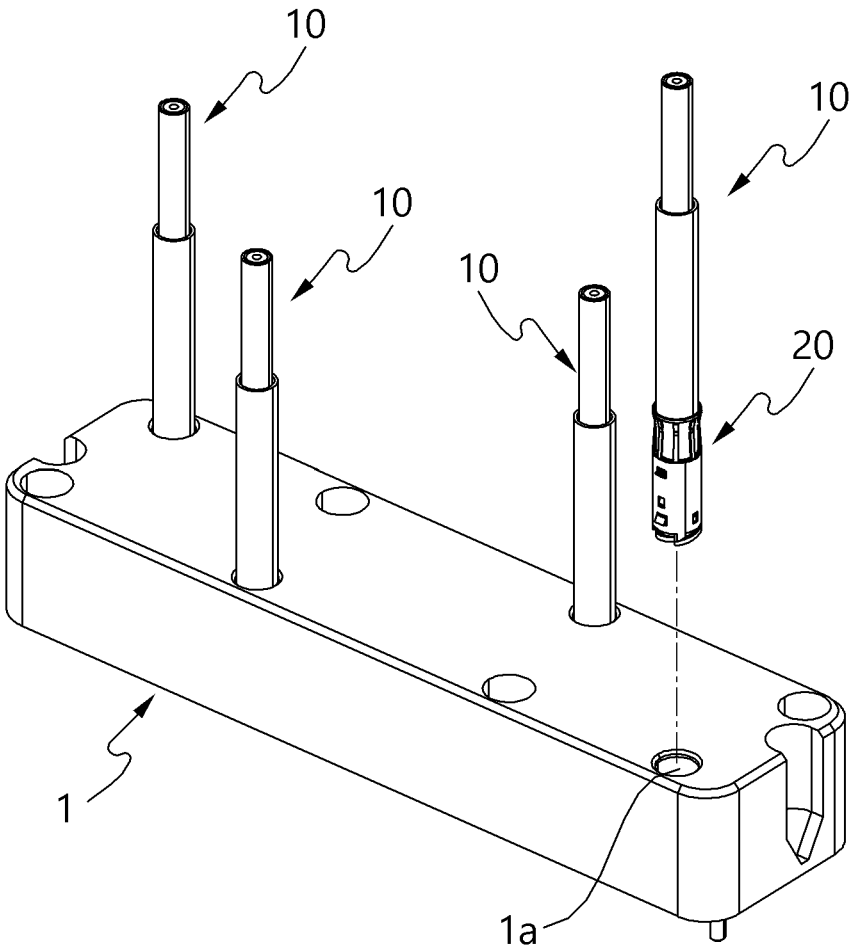

FIG. 1

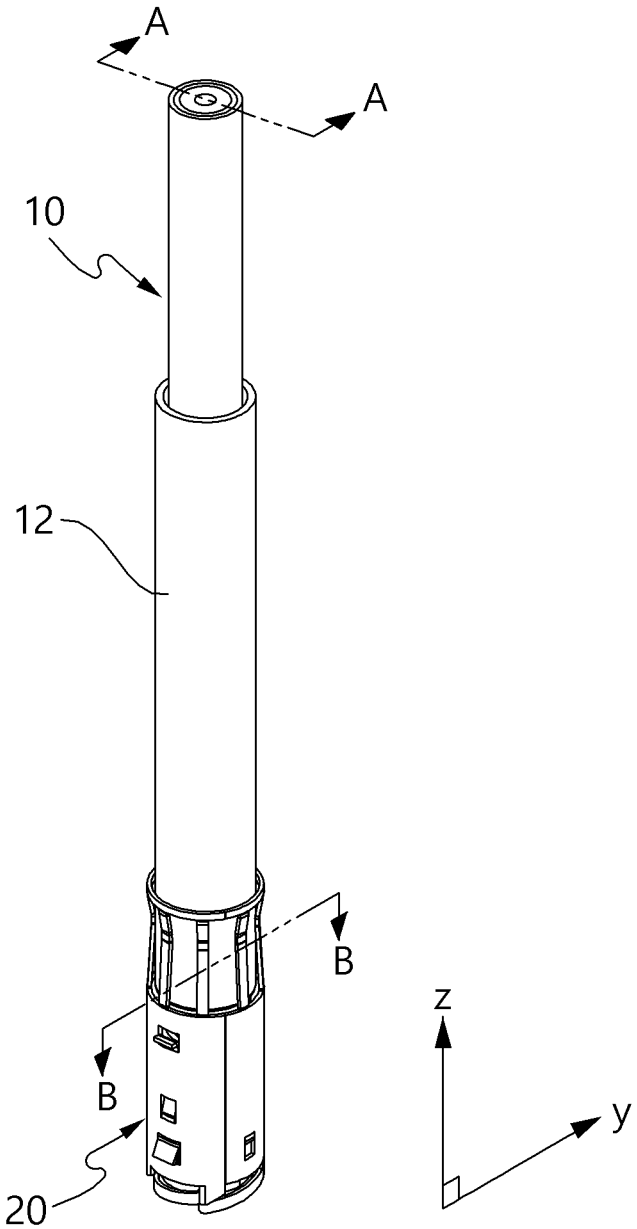

FIG. 2

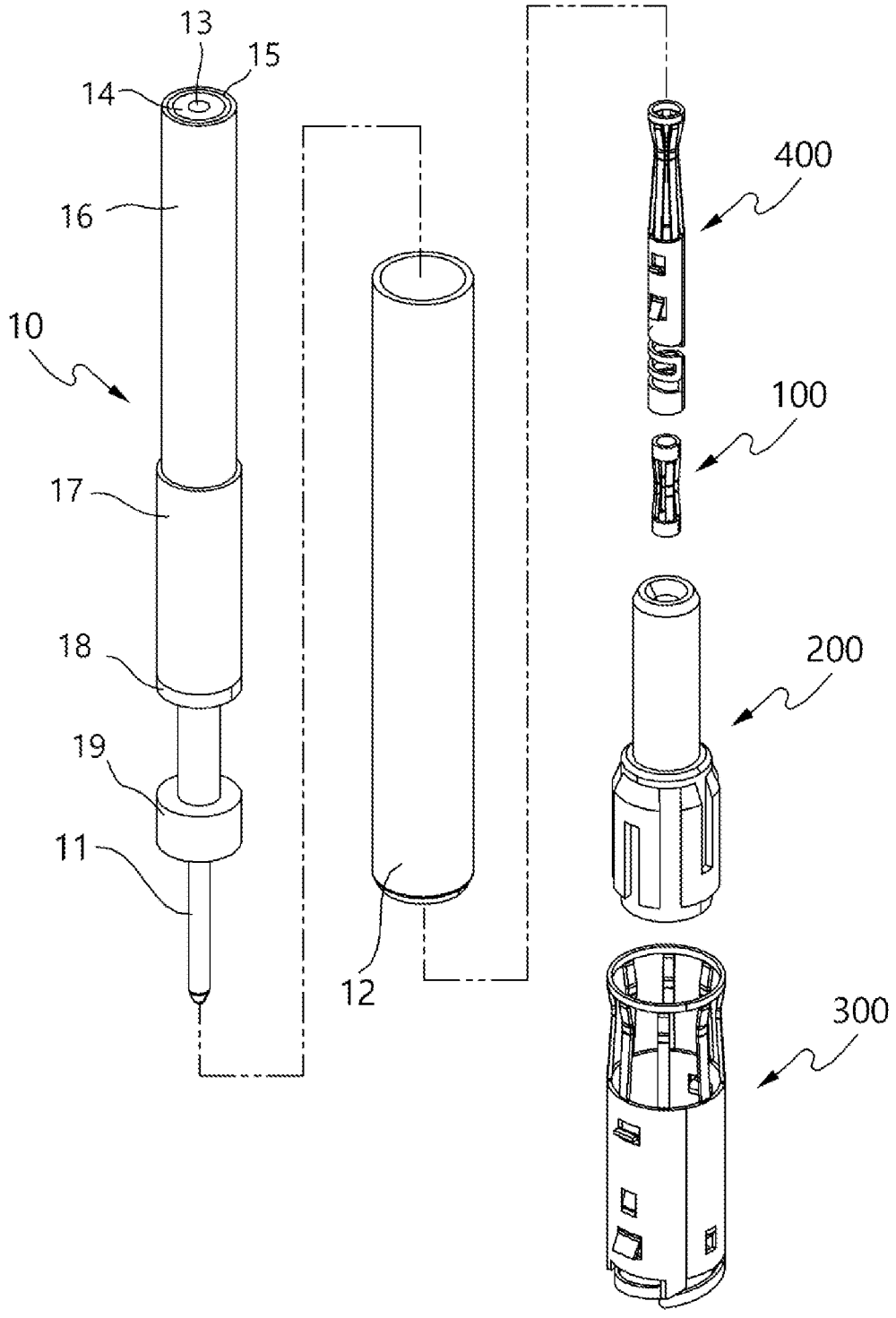

FIG. 3

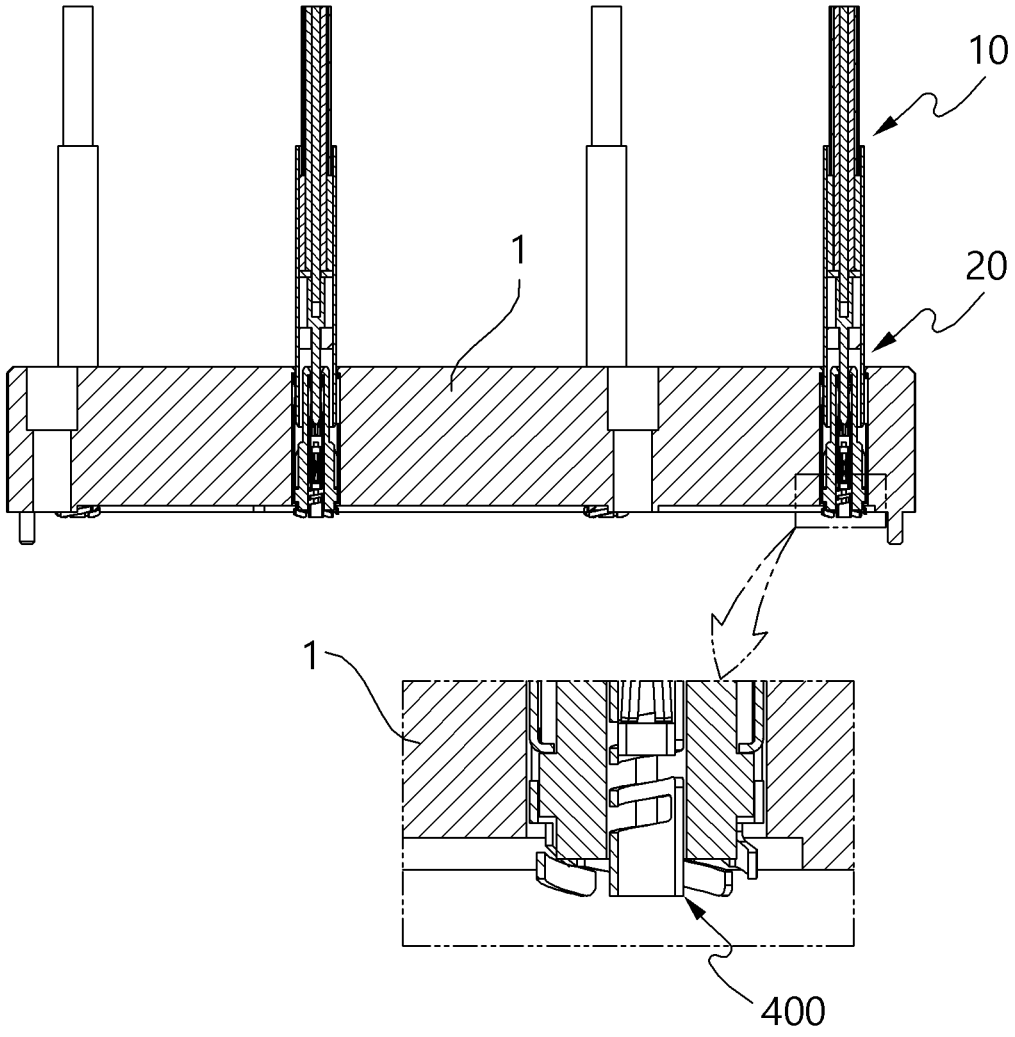

FIG. 4

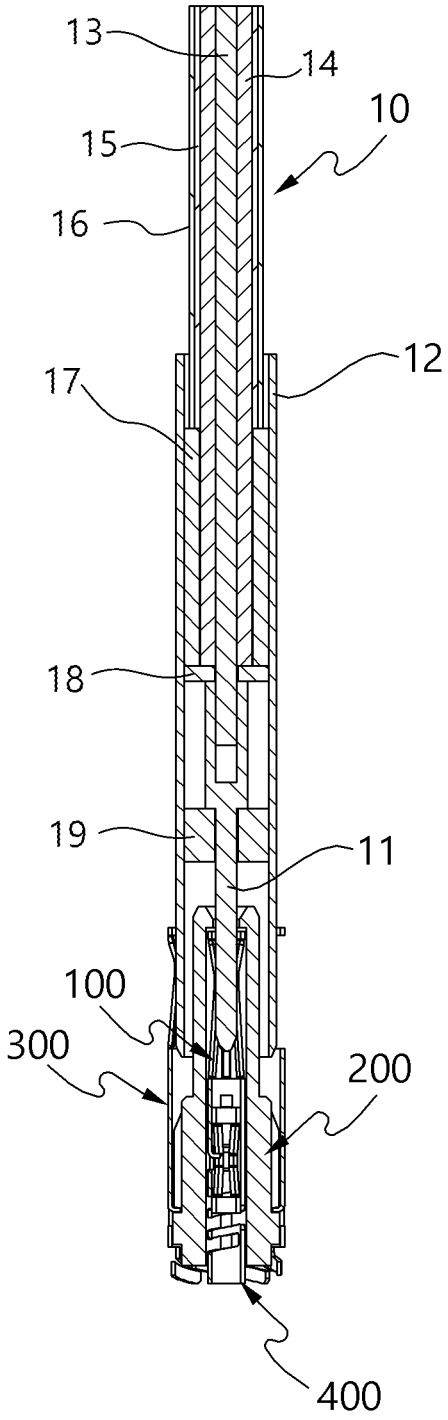

FIG. 5

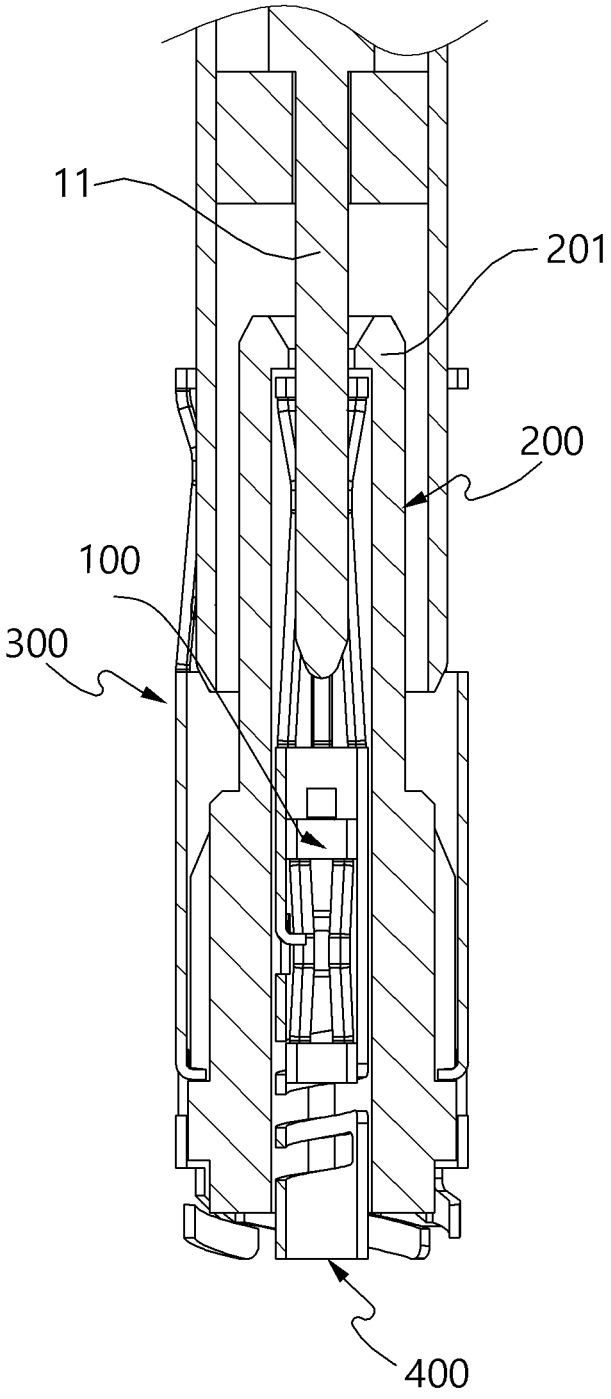

FIG. 6

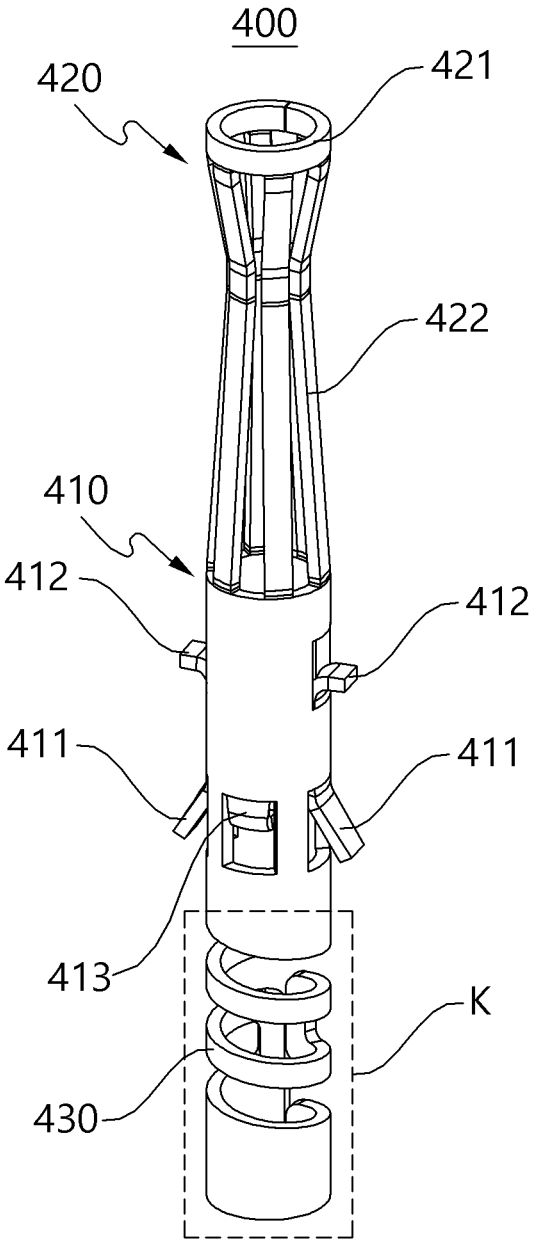

FIG. 7

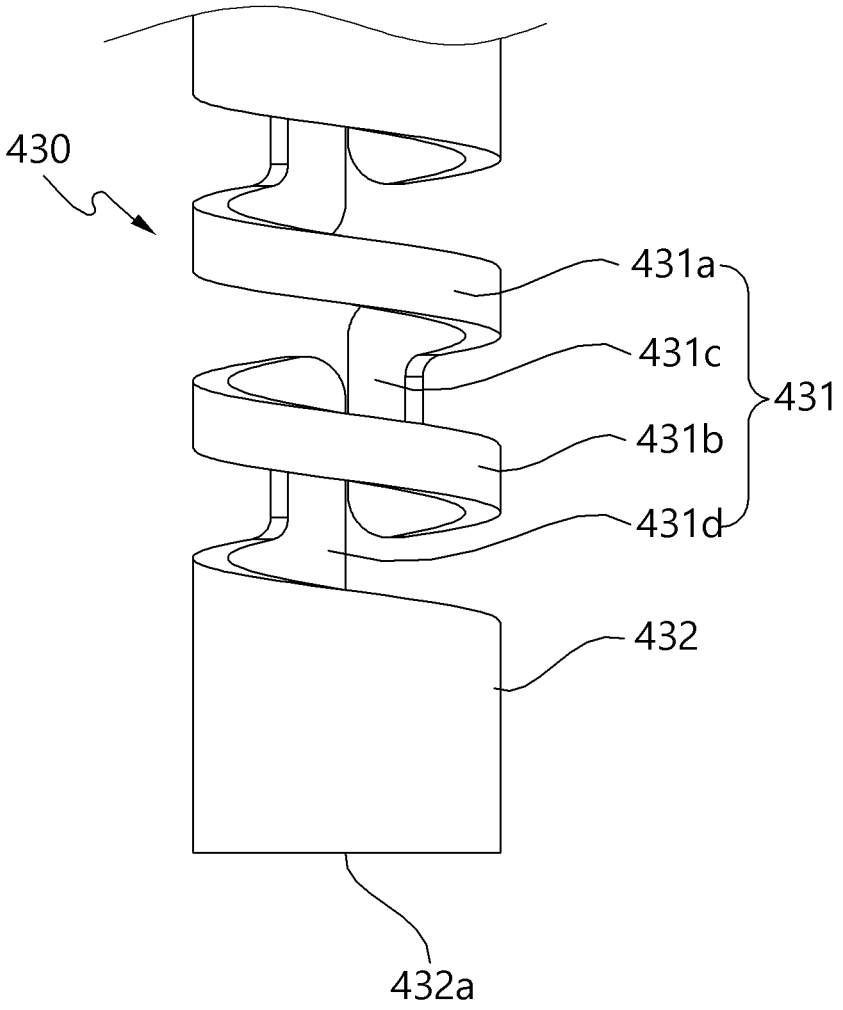

FIG. 8

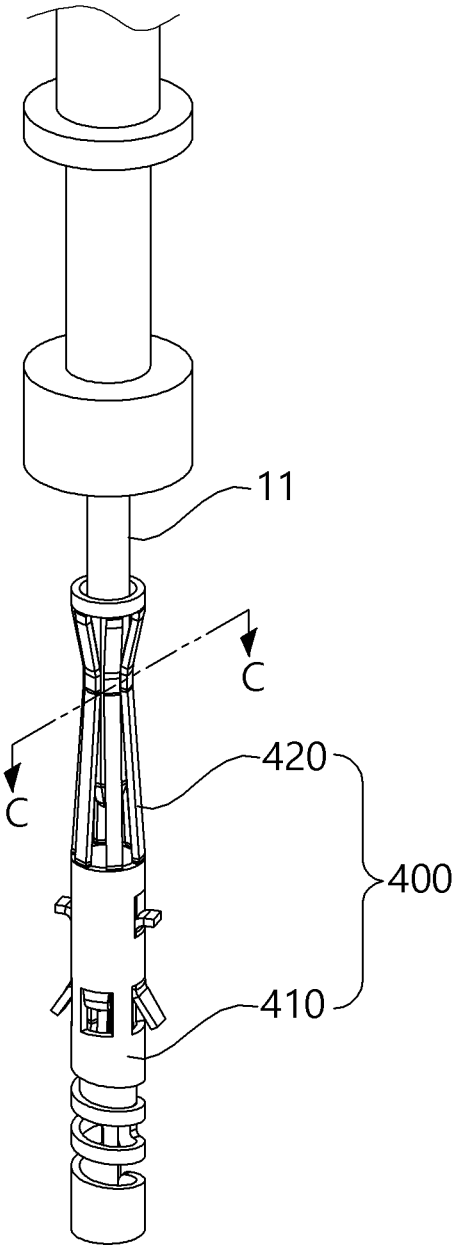

FIG. 9

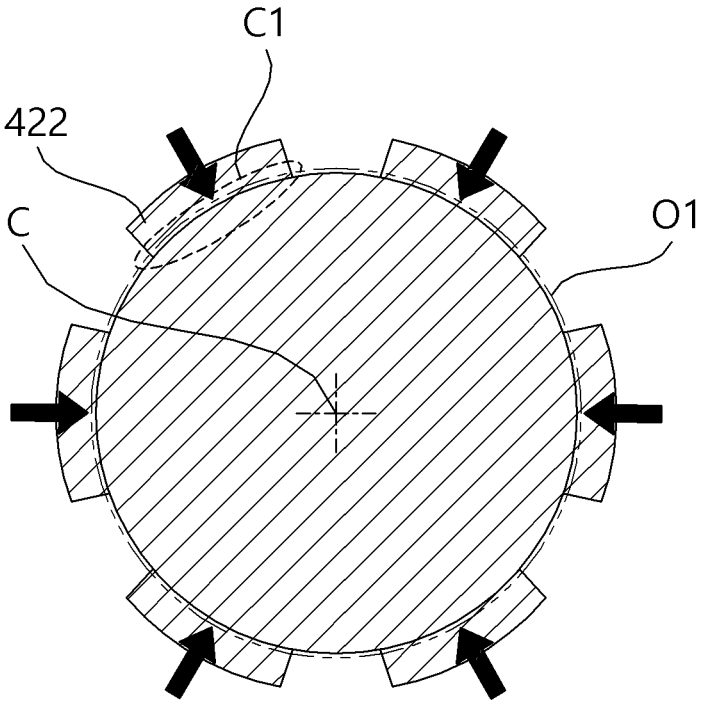

FIG. 10

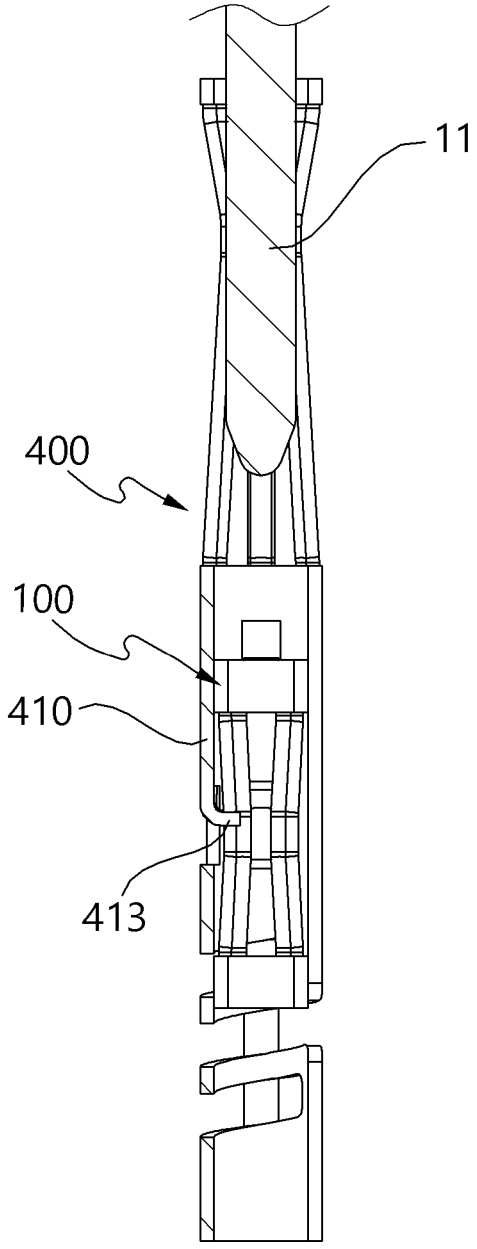

FIG. 11

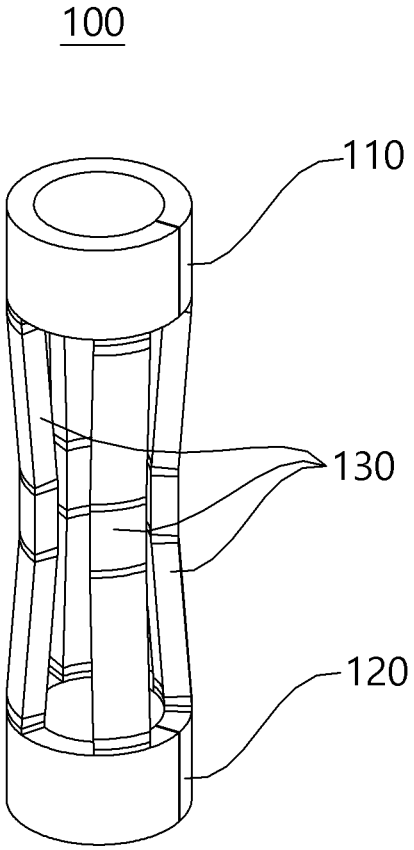

FIG. 12

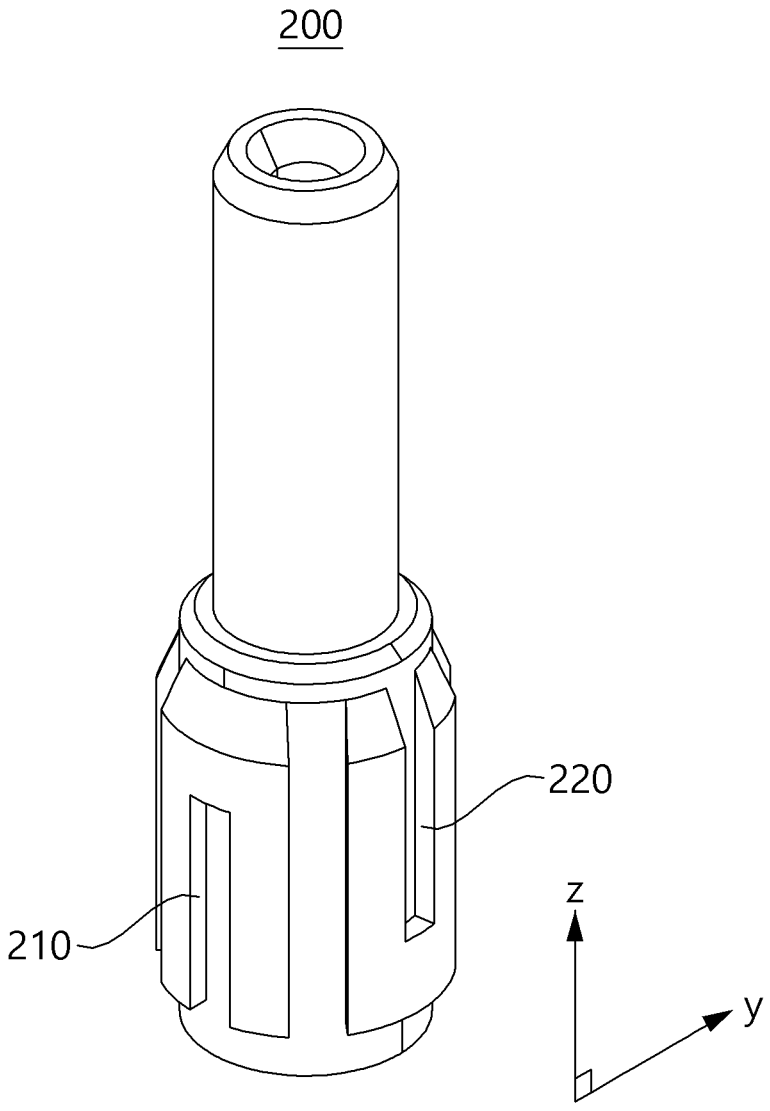

FIG. 13

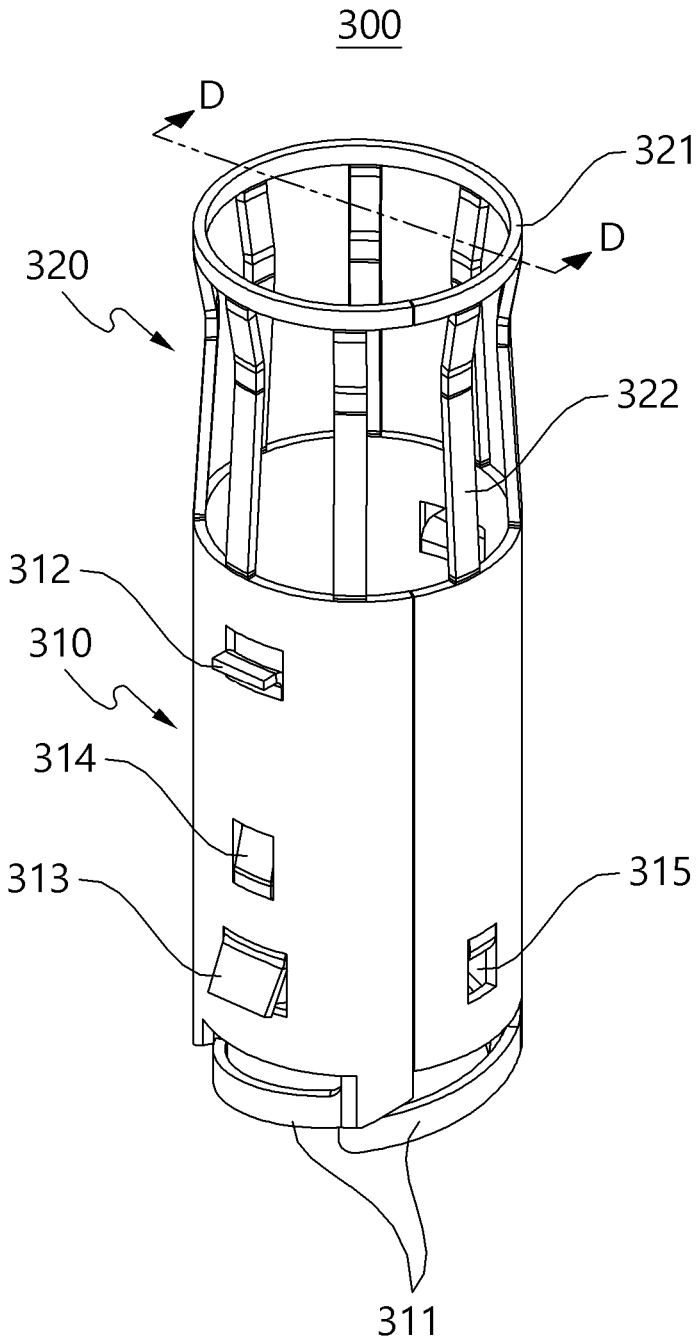

FIG. 14

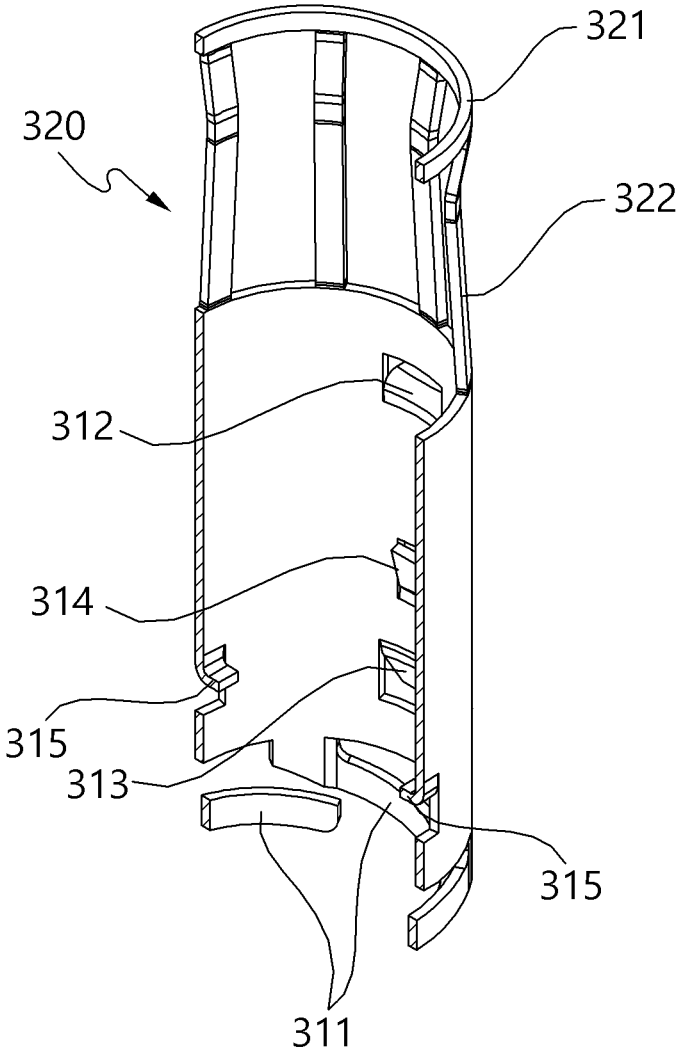

FIG. 15

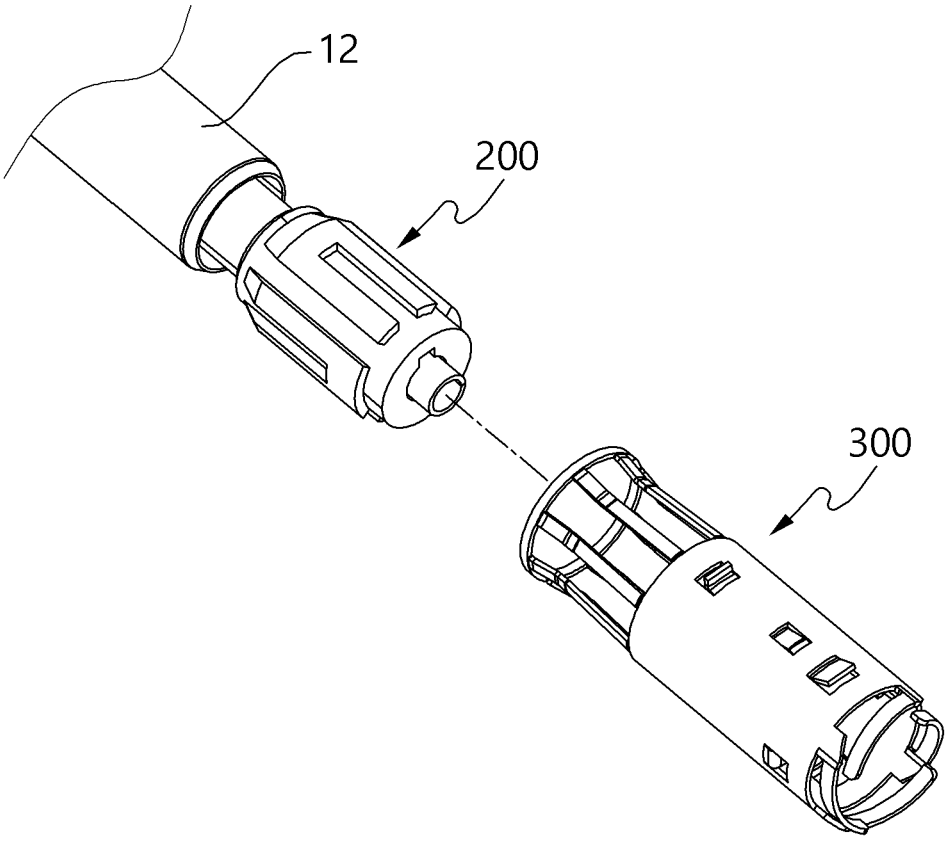

FIG. 16

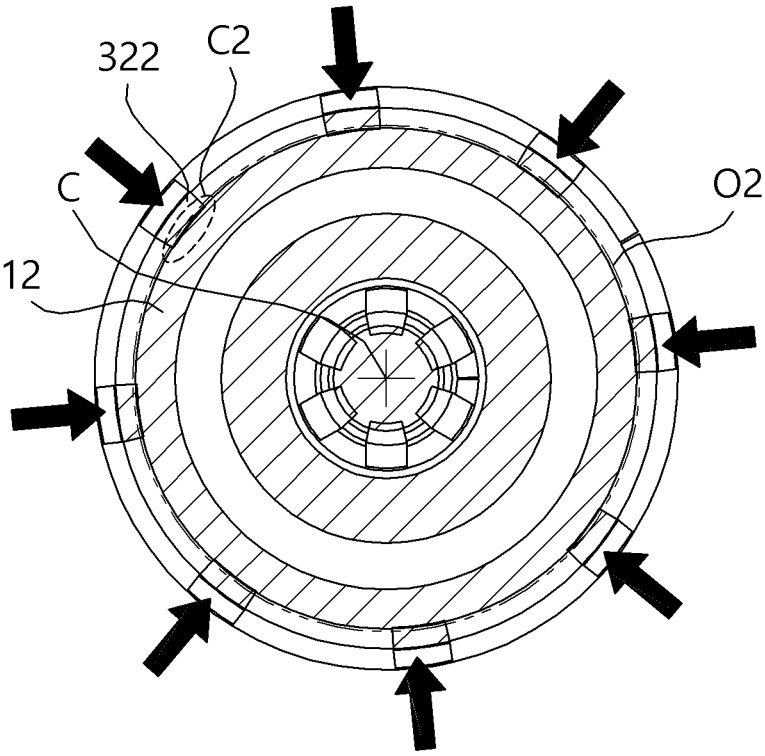

FIG. 17

CABLE ADAPTOR

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application No. 10-2021-0050652, filed on Apr. 19, 2021, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

FIELD

Embodiments relate to a cable adaptor, and more particularly, to an adaptor for electrically connecting a cable to an object being tested while maintaining a common axis with the cable.

BACKGROUND

For equipment performance evaluation, an adaptor which comes into electrical contact with equipment is connected to a cable. The adaptor needs not only to mechanically and electrically connect a signal pin of the cable but to also satisfy impedance matching conditions with an object being tested.

Meanwhile, the cable may include a separate outer conductor for grounding or shielding. Also, for grounding, the adaptor includes a structure for contact with the outer conductor. In the structure of the adaptor, a grounding structure of the adaptor may be implemented in a clip form which comes into elastic contact with the outer conductor of the cable.

However, since the adaptor having the above structure has the clip-form grounding structure with the outer conductor of the cable which pressurizes the cable in one direction, there is a problem that the adaptor has a difficulty in being coaxially connected to the outer conductor of the cable. When the adaptor and the outer conductor of the cable are not coaxially connected to each other, there is a serious difficulty in impedance matching with the object being tested.

Also, generally, the adaptor installed on the signal pin of the cable comes into electrical contact with the signal pin only in one direction, and thus the signal pin of the cable and the adaptor are not coaxially connected. Accordingly, there is a serious difficulty in impedance matching between the adaptor and the signal pin of the cable.

RELATED ART DOCUMENT

Patent Document

Patent Document 0001: Korean Patent Publication No. 2000-0011531

SUMMARY OF THE INVENTION

The present invention is directed to providing a cable adaptor which is capable of being coaxially connected to an outer conductor and a signal line of a cable.

Aspects of the present invention are not limited to the above-stated aspect and other unstated aspects of the present invention will be understood by those skilled in the art from the following disclosure.

According to an aspect of the present invention, there is provided a cable adaptor which is connected to a cable including an outer conductor. The adaptor includes a contact pin which comes into contact with a signal pin of the cable, a first member which is conductive and disposed inside and coupled to the contact pin, a second member disposed outside and coupled to the contact pin, and a third member which is conductive and disposed outside the second member. Here, the contact pin includes a first body coupled to the second member, a first contact portion which is conductive and extends from one side of the first body to come into contact with the signal pin, and a second contact portion which extends from the other side of the first body and comes into contact with an object being tested. The third member includes a second body coupled to the second member and a third contact portion which extends from the second body and comes into contact with the outer conductor. A plurality of first contact points of the signal pin and the first contact portion are arranged at same intervals along a circumferential direction of the signal pin. A plurality of second contact points of the outer conductor and the third contact portion are arranged at same intervals along a circumferential direction of the outer conductor.

The plurality of first contact points may be arranged at same positions in a longitudinal direction of the signal pin, and the plurality of second contact points may be arranged at same positions in a longitudinal direction of the outer conductor.

The first contact portion may include a first ring-shaped frame and a plurality of first legs which extend from the first ring-shaped frame and are connected to the first body. The plurality of first legs may be bent and may come into elastic contact with the signal pin at the first contact points. The third contact portion may include a second ring-shaped frame and a plurality of second legs which extend from the second ring-shaped frame and are connected to the second body. Also, the plurality of second legs may be bent and may come into elastic contact with the outer conductor at the second contact points.

The first member may include an upper ring and a lower ring which come into contact with an inner surface of the contact pin and a plurality of columns arranged at same intervals in a circumferential direction while connecting the upper ring to the lower ring.

The second body may include a plurality of spiral elastic pieces which extend from a lower surface of the second body and are disposed to be spaced apart from the lower surface of the second body.

The second contact portion may include an elastic portion which provides a restoring force at the time of contracting and a tip portion which extends from the elastic portion and comes into contact with the object being tested.

The second member may include a slot portion concavely formed in an outer surface of the second member along a longitudinal direction of the second member. Also, the third member may include a protrusion which protrudes from an inner surface of the third member and is disposed in the slot portion.

The slot portion may include a first slot and a second slot. Here, the first slot and the second slot may be alternately arranged along a circumferential direction of the second member. Also, an inlet of the first slot may be opposite to an inlet of the second slot on the basis of a longitudinal direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent to those of

ordinary skill in the art by describing exemplary embodiments thereof in detail with reference to the accompanying drawings, in which:

FIG. **1** is a perspective view illustrating an assembly in which adaptors to which assembly cables are fastened are arranged;

FIG. **2** is a perspective view illustrating the adaptor to which the assembly cable is fastened;

FIG. **3** is an exploded view illustrating the adaptor shown in FIG. **2**;

FIG. **4** is a side cross-sectional view of the assembly shown in FIG. **1** in which the adaptors are arranged;

FIG. **5** is a side cross-sectional view of the adaptor on the basis of line A-A of FIG. **2**;

FIG. **6** is a side cross-sectional view of the adaptor;

FIG. **7** is a perspective view illustrating a contact pin;

FIG. **8** is an enlarged view illustrating part k of FIG. **7**;

FIG. **9** is a view illustrating a contact pin in which a signal pin of the cable is inserted;

FIG. **10** is a cross-sectional view of the contact pin on the basis of line C-C shown in FIG. **9**;

FIG. **11** is a side cross-sectional view of the adaptor in which a first member is disposed inside the contact pin;

FIG. **12** is a view illustrating the first member;

FIG. **13** is a view illustrating a second member;

FIG. **14** is a view illustrating a third member;

FIG. **15** is a side cross-sectional view of the third member;

FIG. **16** is a view illustrating the third member which is mounted on the cable; and

FIG. **17** is a cross-sectional view of the third member on the basis of line B-B shown in FIG. **2**.

DETAILED DESCRIPTION

The purpose, particular advantages, and novel features will be more clarified from exemplary embodiments and the following detailed description related to the attached drawings. Also, the terms or words used in the specification and the claims should not be limited to general or lexical meanings and should be construed as meanings and concepts coinciding with the technical concept of the present invention on the basis of a principle that the inventor can appropriately define the concepts of the terms to explain the invention in the best way. Also, in description of the present invention, detailed description of well-known arts related to the present invention will be omitted when it is deemed to unnecessarily obscure the essentials of the present invention.

Also, in describing components of the embodiment of the present invention, terms such as "first," "second," "A," "B," and the like may be used. These terms are merely for distinguishing one element from another, and the essential, order, sequence, and the like of corresponding elements are not limited by the terms.

FIG. **1** is a perspective view illustrating an assembly in which adaptors **20** to which cables are fastened are arranged according to an embodiment.

Hereinafter, in describing the embodiment, a "longitudinal" direction is shown as a z-axis in the drawings, which refers to a direction in which the cable and the adaptor are coupled, and a direction perpendicular to the z-axis is shown as a y-axis in the drawings. Hereinafter, a circumferential direction is based on a center of the cable.

A plurality of such adaptors **20** may be arranged at certain intervals on a base **1**. In FIG. **1**, only some of the plurality of adaptors **20** arranged on the base **1** may be shown. The base **1** may include a plurality of holes **1***a* passing through an upper surface and a lower surface. The adaptors **20** may be inserted into the holes **1***a*, respectively. An assembly cable **10** is connected to the adaptor **20**. The adaptor **20** comes into contact with an object being tested. The adaptor **20** electrically connects the assembly cable **10** to the object being tested. The object being tested may be an electronic device such as a semiconductor chip.

In one or more embodiments, in an assembly sequence, the adaptor **20** may be mounted on the base **1** and then the cable **10** may be fastened to the adaptor **20**. Here, the adaptor **20** may be inserted into the base **1** from top to bottom in a z-axis direction to be assembled or may be inserted into the base **1** from bottom to top to be assembled. While the adaptor **20** is assembled with the base **1**, the cable **10** may be inserted into the adaptor **20** from top to bottom in the z-axis direction to be assembled.

Since the assembly cable **10** shown in the drawing is merely an example of assembly cables which the adaptor **20** of the present invention can accommodate, the present invention is not limited to a configuration of the cable **10** and the adaptor **20** of the present invention may accommodate a variety of types of assembly cables.

In one or more embodiments, a tubular outer conductor **12** may be exposed outside the assembly cable **10**. The outer conductor **12** may be a metal member which functions as a shield. Here, the cable **10** may be a coaxial cable. The cable **10** may include a signal line **13** in the innermost part, a dielectric **14** which surrounds the signal line **13**, a conductor **15** which surrounds the dielectric **14**, and an outer cover **16** which surrounds the conductor **15**. The signal line **13** may be exposed externally from one end of the cable **10**, and the externally exposed signal line **13** may be inserted into a signal pin **11**. The conductor **15** and the outer cover **16** are partially removed from the cable **10** so that the dielectric **14** may be exposed. Here, a cylindrical connecting conductor **17** which surrounds the exposed dielectric **14** may be included. Since the conductor **15** of the cable **10** may come into contact with the connecting conductor **17** on one end, the conductor **15** may be electrically connected to the outer conductor **12** which surrounds the connecting conductor **17**. Also, an annular insulator **18** which prevents contact between the signal line **11** and the connecting conductor **17** may be provided, in a longitudinal direction, between the signal pin **11** and the connecting conductor **17**. An insulator block **19** which supports the signal pin **11** against the outer conductor **12** may be installed on an outer circumference of the signal pin **11**. However, this is merely an embodiment and the configuration of the cable **10** is not limited thereto.

FIG. **2** is a perspective view illustrating the adaptor **20** to which the assembly cable **10** is fastened, and FIG. **3** is an exploded view illustrating the adaptor **20** shown in FIG. **2**.

Referring to FIG. **3**, the adaptor **20** may include a first member **100**, a second member **200**, a third member **300**, and a contact pin **400**.

In the embodiment of the present invention, the contact pin **400** is electrically connected to the signal line **13** through the signal pin **11** of the cable **10** and functions as a pin which transmits a signal but is not limited thereto and may function as a ground pin or power pin when connected to a ground or electrically connected to a power line which transmits a voltage and current.

The first member **100** comes into electrical contact with the contact pin **400**. The first member **100** may be disposed inside the contact pin **400**. The first member **100** includes a conducting material and compensates impedance corresponding to a shape of the contact pin **400**.

The second member **200** is disposed outside the contact pin **400**. Part of the second member **200** may be disposed inside the outer conductor **12**.

The third member **300** comes into electrical contact with the outer conductor **12** of the cable **10**. The third member **300** is disposed outside the second member **200**. The third member **300** is coupled to the second member **200**. Also, the third member **300** is a conducting material.

The contact pin **400** comes into direct contact with the signal pin **11**. The signal pin **11** may be inserted into the contact pin **400**. The contact pin **400** comes into electrical contact with the object being tested. A part of the contact pin **400** which comes into electrical contact with the object being tested may be formed to have a restoring force at the time of contracting.

FIG. **4** is a side cross-sectional view of the assembly shown in FIG. **1** in which the adaptors **20** are arranged.

Referring to FIG. **4**, an end of the adaptor **20** may protrude from the lower surface of the base **1** and come into contact with the object being tested. The contact pin **400** may protrude from the end of the adaptor **20** and come into contact with the object being tested.

FIG. **5** is a side cross-sectional view of the adaptor **20** on the basis of line A-A of FIG. **2**, and FIG. **6** is a side cross-sectional view illustrating a lower side of the adaptor **20**.

Referring to FIGS. **5** and **6**, the signal pin **11** of the cable **10** is disposed on an upper side inside the contact pin **400**. The second member **200** is formed as a hollow member, and thus the contact pin **400** is located thereinside. Since a stepped structure **201** is disposed on an upper end of the inside of the second member **200**, there is an advantage that the contact pin **400** is caught by the stepped structure **201** and not pushed back when the contact pin **400** is pushed. The third member **300** is coupled to an outside the second member **200**.

FIG. **7** is a perspective view illustrating the contact pin **400**.

Referring to FIG. **7**, the contact pin **400** may include a first body **410**, a first contact portion **420**, and a second contact portion **430**.

The first body **410** is a cylindrical member and coupled to the second member **200**. The first body **410** may include a first protrusion **411** and a second protrusion **412**. The first protrusion **411** and the second protrusion **412** are sections formed by cutting parts of the first body **410** and may be bent and protrude outward. The first protrusion **411** may be bent downward toward outside of the first body **410**. The second protrusion **412** may be bent upward toward outside of the first body **410**.

The first protrusion **411** and the second protrusion **412** may come into elastic contact with an inner circumferential surface of the second member **200** and increase a coupling property of the contact pin **400** to the second member **200**. The first protrusion **411** and the second protrusion **412** are symmetrically arranged on the basis of a center of the first body **410** so as to facilitate coaxial coupling of the contact pin **400** and the second member **200** to the cable **10**.

The first body **410** may include a third protrusion **413**. The third protrusion **413** is a section obtained by cutting a part of the first body **410** and may be bent inward and may protrude toward an inside of the first body **410**. The third protrusion **413** performs a function of preventing the first member **100** from being detached from the contact pin **400**. In one or more embodiments, the third protrusion **413** is disposed in a part concavely bent toward an inside of a column **130** of the first member **100** so as to prevent the first member **100** from being vertically detached from an inside of the contact pin **400**.

The first contact portion **420** is a part which comes into contact with the signal pin **11** of the cable **10**. The first contact portion **420** is disposed to extend upward from the first body **410**. The first contact portion **420** may include a first ring-shaped frame **421** and a plurality of first legs **422**. The first ring-shaped frame **421** may be disposed to be spaced apart from the first body **410** in a longitudinal direction (z-axis), and the plurality of first legs **422** may extend from the first ring-shaped frame **421** and may be connected to an upper surface of the first body **410**. The first legs **422** may be arranged at certain intervals along a circumferential direction of the first ring-shaped frame **421**.

The first legs **422** may have a bent shape to be partially located more inward than the first ring-shaped frame **421**. For example, the plurality of first legs **422** may have a shape in which an intermediate area is formed to be concave in the longitudinal direction (z-axis). The first legs **422** may include an elastically deformable material. The plurality of first legs **422** may have the same size and shape.

The signal pin **11** of the cable **10** passes through the first ring-shaped frame **421** and is inserted into the first contact portion **420** along the first legs **422**. The contact pin **400** may come into coaxial contact with the signal pin **11** through the plurality of first legs **422**.

FIG. **8** is an enlarged view illustrating part k of FIG. **7**.

Referring to FIGS. **7** and **8**, the contact pin **400** may include the second contact portion **430** which comes into contact with the object being tested. The second contact portion **430** may include an elastic portion **431** and a tip portion **432**. The elastic portion **431** is formed to have a spiral shape to provide elasticity to the contact portion **430** like a spring. In one or more embodiments, the elastic portion **431** may include a first elastic piece **431***a* and a second elastic piece **431***b* which are formed integrally. Also, the elastic portion **431** may include a first connection portion **431***c* which is linearly formed and connects the first elastic piece **431***a* to the second elastic piece **431***b* and a second connection portion **431***d* which is linearly formed and connects the second elastic piece **431***b* to the tip portion **432**. The elastic portion **431** provides a restoring force when the contact pin **400** comes into contact with the object being tested.

FIG. **9** is a view illustrating the contact pin **400** in which the signal pin **11** of the cable **10** is inserted, and FIG. **10** is a cross-sectional view of the contact pin **400** on the basis of line C-C shown in FIG. **9**.

Referring to FIGS. **9** and **10**, part of a bent area of the first leg **422** comes into elastic contact with the signal pin **11** so as to form a first contact point C**1**. Since the plurality of first legs **422** are arranged to be rotationally symmetrical on the basis of a center C of the cable **10**, a plurality of such first contact points C**1** are arranged at same intervals along a circumferential direction of the signal pin **11**. Also, the plurality of first contact points C**1** may be arranged on a first circumference O**1** formed on the basis of the center C of the cable **10**. Also, the plurality of first contact points C**1** may be arranged at the same positions in the longitudinal direction (z-axis) of the signal pin **11**.

Since the plurality of first legs **422** come into elastic contact with the signal pin **11** in a radial direction as described above, the adaptor **20** is not biased toward the center C of the cable **10** and is coaxially coupled to the cable **10** so as to facilitate impedance matching.

FIG. **11** is a side cross-sectional view of the adaptor in which the first member **100** is disposed inside the contact pin **11**, and FIG. **12** is a view illustrating the first member **100**.

Since the elastic portion **430** of the contact pin **400** has a shape which forms an air gap between the first elastic piece **431***a* and the second elastic piece **431***b* and has an influence on impedance, the first member **100** which is conductive is inserted into the contact pin **400** for compensation for impedance.

The first member **100** may include an upper ring **110**, a lower ring **120**, and a plurality of such columns **130**.

The upper ring **110** and the lower ring **120** come into contact with an inner surface of the contact pin **400**. The plurality of columns **130** connect the upper ring **110** to the lower ring **120**. The plurality of columns **130** are arranged to be spaced at same intervals in a circumferential direction. The respective columns **130** may be partially formed to be concavely bent inward. The first member **100** having the above shape may have a structure elastically deformable in the longitudinal direction (z-axis) to increase a coupling force with the contact pin **400**.

As described above, there is an effect of compensating negative influences such as a decline in impedance which may occur due to the air gap between the elastic pieces of the elastic portion **430** using the first member **100** which is conductive and includes the plurality of columns **130** coaxially formed.

FIG. **13** is a view illustrating the second member **200**.

Referring to FIG. **13**, the second member **200** may include a slot portion **210** and **220**. The slot portion **210** and **220** is concavely formed in an outer surface of the second member **200**. The slot portion **210** and **220** may be disposed along the longitudinal direction (z-axis). The slot portion **210** and **220** may include a first slot **210** and a second slot **220**. The first slot **210** may have an inlet which is formed downward. On the other hand, the second slot **220** may have an inlet which is formed upward. The first slot **210** and the second slot **220** may be alternately arranged at same intervals along a circumferential direction of the contact pin **400**.

A fifth protrusion **314** (refer to FIG. **14**) of the third member **300** is disposed in the first slot **210**. A sixth protrusion **315** (refer to FIG. **14**) of the third member **300** is disposed in the second slot **220**.

FIG. **14** is a view illustrating the third member **300**, and FIG. **15** is a side cross-sectional view of the third member **300**.

Referring to FIGS. **14** and **15**, the third member **300** may include a second body **310** and a third contact portion **320**.

The second body **310** is a cylindrical member and coupled to the second member **200**. The second body **310** may include a third protrusion **312** and a fourth protrusion **313**. The third protrusion **312** and the fourth protrusion **313** are sections formed by cutting parts of the second body **310** and may be bent and protrude outward. The fourth protrusion **313** may be bent downward toward outside of the second body **310**. The third protrusion **312** may be bent upward toward outside of the second body **310**.

The third protrusion **312** and the fourth protrusion **313** may come into contact with an inner surface of the hole **1***a* of the base **1** and secure a fixing force of the adaptor **20** and the base **1**.

Meanwhile, the second body **310** may include the fifth protrusion **314** and the sixth protrusion **315** as protrusions disposed in the slot portion **210** and **220**. The fifth protrusion **314** and the sixth protrusion **315** are sections formed by cutting parts of the second body **310** and may be bent inward and protrude toward inside of the second body **310**. The fifth protrusion **314** may be bent upward toward inside of the second body **310**. The sixth protrusion **315** may be bent downward toward inside of the second body **310**.

The fifth protrusion **314** may be disposed in the first slot **210** of the second member **200**, and the sixth protrusion **315** may be disposed in the second slot **220** of the second member **200**. The fifth protrusion **314** and the sixth protrusion **315** may secure a coupling property of the second member **200** and the third member **300**, prevent the third member **300** from being separated from the second member **200** in the longitudinal direction (z-axis), and prevent a slip occurring between the second member **200** and the third member **300** in a circumferential direction.

The second body **310** may include a plurality of elastic pieces **311**. Each of the elastic pieces **311** extends from a lower surface of the second body **310** and is disposed to be spaced apart from the lower surface of the second body **310**. The elastic pieces **311** may be formed to have a spiral shape. The plurality of elastic pieces **311** may be disposed to be spaced apart from each other. A lower end of the elastic piece **311** comes into contact with the object being tested.

When a load is added in the longitudinal direction (z-axis), the elastic piece **311** contracts in the longitudinal direction (z-axis) and provides a restoring force. When coupled to the object being tested, the elastic piece **311** having the spiral shape contracts in the longitudinal direction to have an approximately circular-ring shape to come into coaxial contact with the object being tested so that there is an effect of facilitating impedance matching.

The third contact portion **320** is a part which comes into contact with the outer conductor **12** of the cable **10**. The third contact portion **320** is disposed to extend upward from the second body **310**. The third contact portion **320** may include a second ring-shaped frame **321** and a plurality of second legs **322**. The second ring-shaped frame **321** may be disposed to be spaced apart from the second body **310** in the longitudinal direction (z-axis), and the plurality of second legs **322** may extend from the second ring-shaped frame **321** and may be connected to an upper surface of the second body **310**. The second legs **322** may be arranged at certain intervals along a circumferential direction of the second ring-shaped frame **321**.

The second legs **322** may have a bent shape to be partially located more inward than the second ring-shaped frame **321**. For example, the plurality of second legs **322** may have a shape in which an intermediate area is formed to be concave in the longitudinal direction (z-axis). The second legs **322** may include an elastically deformable material. The plurality of second legs **322** may have the same size and shape.

The outer conductor **12** of the cable **10** passes through the second ring-shaped frame **321** and is inserted into the third contact portion **320** along the second legs **322**.

FIG. **16** is a view illustrating the third member **300** which is mounted on the cable **10**, and FIG. **17** is a cross-sectional view illustrating the third member **300** on the basis of line B-B shown in FIG. **2**.

Referring to FIGS. **16** and **17**, while the second member **200** is mounted on the cable **10**, the third member **300** is mounted. When the third member **300** is mounted, the third member **300** may be disposed outside the second member **200** and the outer conductor **12**.

Part of a bent area of the second leg **322** comes into elastic contact with the outer conductor **12** so as to form a second contact point C**2**. Since the plurality of second legs **322** are arranged to be rotationally symmetrical on the basis of the center of the cable **10**, a plurality of such second contact points C**2** are arranged at same intervals along a circumfer-

ential direction of the outer conductor **12**. Also, the plurality of second contact points C**2** may be arranged on a second circumference O**2** formed on the basis of the center C of the cable **10**. Also, the plurality of second contact points C**2** may be arranged at the same positions in the longitudinal direction (z-axis) of the outer conductor **12**.

Since the plurality of second legs **322** come into elastic contact with the outer conductor **12** in a radial direction as described above, the adaptor **20** is not biased toward the center of the cable **10** and is coaxially coupled to the cable **10** so as to facilitate impedance matching.

According to the embodiment of the present invention, since the signal pin **11** is supported in the radial direction by the plurality of first legs **422** and the outer conductor **12** which is connected to the ground is supported by the plurality of second legs **322** in the radial direction, there is an advantage that the adaptor **20** can coaxially connect the ground (outer conductor **12**) and the signal pin **11** of the cable **10** at the same time so as to facilitate impedance matching with the object being tested.

The cable adaptor **20** according to one exemplary embodiment of the present invention has been described above in detail with reference to the attached drawings.

According to embodiments, an adaptor is configured to come into contact with and support a signal pin of a cable in a radial direction and to come into contact with and support an outer conductor of the cable in a radial direction so as to easily implement the cable and the adaptor which are coaxial.

According to embodiments, since a conductive first member having a coaxial shape is disposed inside the contact pin, there is an advantage of compensating negative influences which may occur due to a shape of the contact pin in impedance matching.

According to embodiments, since the signal pin is guided along first legs while inserted into a first contact portion of the contact pin so as to form a plurality of first contact points formed along a circumferential direction, there is an advantage of easily implementing the cable and the adaptor which are coaxial.

According to embodiments, since a third member is guided along second legs while inserted into a second contact portion so as to form a plurality of second contact points formed along a circumferential direction, there is an advantage of easily implementing the cable and the adaptor which are coaxial.

According to embodiments, since the adaptor remains in coaxial contact with not only the signal pin but the outer conductor of the cable, there is an advantage of easy impedance matching with an object being tested.

The above-described embodiment of the present invention should be understood as being exemplary and not limitative in every aspect, and the scope of the present invention will be defined by the following claims rather than the above detailed description. Also, not only the meaning and scope of the claims but all changeable or modifiable forms derived from the equivalent concept thereof should be construed as being included in the scope of the present invention.

What is claimed is:

1. A cable adaptor which is connected to a cable including an outer conductor, comprising:

a contact pin which comes into contact with a signal pin of the cable;

a first member which is conductive and disposed inside and coupled to the contact pin;

a second member disposed outside and coupled to the contact pin; and

a third member which is conductive and disposed outside the second member,

wherein the contact pin comprises a first body coupled to the second member, a first contact portion which is conductive and extends from one side of the first body to come into contact with the signal pin, and a second contact portion which extends from the other side of the first body and comes into contact with an object being tested,

wherein the third member comprises a second body coupled to the second member and a third contact portion which extends from the second body and comes into contact with the outer conductor,

wherein a plurality of first contact points of the signal pin and the first contact portion are arranged at same intervals along a circumferential direction of the signal pin, and

wherein a plurality of second contact points of the outer conductor and the third contact portion are arranged at same intervals along a circumferential direction of the outer conductor.

2. The adaptor of claim **1**, wherein the plurality of first contact points are arranged at same positions in a longitudinal direction of the signal pin, and

wherein the plurality of second contact points are arranged at same positions in a longitudinal direction of the outer conductor.

3. The adaptor of claim **1**, wherein the first contact portion comprises a first ring-shaped frame and a plurality of first legs which extend from the first ring-shaped frame and are connected to the first body,

wherein the plurality of first legs are concavely bent inward and each come into elastic contact with the signal pin at the first contact points,

wherein the third contact portion comprises a second ring-shaped frame and a plurality of second legs which extend from the second ring-shaped frame and are connected to the second body, and

wherein the plurality of second legs are concavely bent inward and each come into elastic contact with the outer conductor at the second contact points.

4. The adaptor of claim **1**, wherein the first member comprises an upper ring and a lower ring which come into contact with an inner surface of the contact pin and a plurality of columns arranged at same intervals in a circumferential direction while connecting the upper ring to the lower ring.

5. The adaptor of claim **1**, wherein the second body comprises a plurality of spiral elastic pieces which extend from a lower surface of the second body and are disposed to be spaced apart from the lower surface of the second body.

6. The adaptor of claim **1**, wherein the second contact portion comprises an elastic portion which provides a restoring force at the time of contracting and a tip portion which extends from the elastic portion and comes into contact with the object being tested.

7. The adaptor of claim **1**, wherein the second member comprises a slot portion concavely formed in an outer surface of the second member along a longitudinal direction of the second member, and

wherein the third member comprises a protrusion which protrudes from an inner surface of the third member and is disposed in the slot portion.

8. The adaptor of claim **7**, wherein the slot portion comprises a first slot and a second slot,

wherein the first slot and the second slot are alternately arranged along a circumferential direction of the second member, and

wherein an inlet of the first slot is opposite to an inlet of the second slot on the basis of a longitudinal direction.

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